Particle Swarm Optimization for Time Series Motif Discovery

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Abstract
Efficiently finding similar segments or motifs in time series data is a fundamental task that, due to the ubiquity of these data, is present in a wide range of domains and situations. Because of this, countless solutions have been devised but, to date, none of them seems to be fully satisfactory and flexible. In this article, we propose an innovative standpoint and present a solution coming from it: an anytime multimodal optimization algorithm for time series motif discovery based on particle swarms. By considering data from a variety of domains, we show that this solution is extremely competitive when compared to the state-of-the-art, obtaining comparable motifs in considerably less time using minimal memory. In addition, we show that it is robust to different implementation choices and see that it offers an unprecedented degree of flexibility with regard to the task. All these qualities make the presented solution stand out as one of the most prominent candidates for motif discovery in long time series streams. Besides, we believe the proposed standpoint can be exploited in further time series analysis and mining tasks, widening the scope of research and potentially yielding novel effective solutions.

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